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ABSTRACT

In an initial section, this paper presents a review of the literature and discusses the hypothesized relationship between self-efficacy, (defined as personal judgments of how well one can organize and implement behaviors in situations that may contain novel, unpredictable and possibly stressful elements) and achievement behavior. Source of efficacy information, i.e., performance attainments, vicarious experiences, social persuasion, and physiological indices, are discussed in detail. The processes involved in the integration of efficacy information are described. A second section reviews research on the self-efficacy model, focusing on studies which collectively address the relationship of self-efficacy to achievement behavior in the context of competency development. The presentation of the basic components of the reseach studies includes a focus on processes to develop self-efficacy skills; the use of subtraction or division tasks, pre-test, post-test designs for self-efficacy assessments, and participation in competency development programs over multiple sessions. An extensive bibliography is appended. (PAS)

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Self-Efficacy Perspective On Achievement Behavior

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Running head: Self-Efficacy

Abstract

This article addresses the role of perceived self-efficacy in achievement situations. Students gain information about their level of self-efficacy from their actual task performances, vicarious experiences, social persuasory influences, and physiological indices. Even in enactive contexts, past performances do not affect self-efficacy automatically but are judged against performance cues such as perceived task difficulty, effort expenditure, situational circumstances, and outcome patterns. A program of research is examined that collectively addresses two general hypotheses: (1) Self-efficacy is an important variable in understanding students' achievement behaviors, and (2) Educational procedures that help validate students' sense of efficacy promote task motivation and achievement. Future research should explore in greater detail how students form achievement-related cognitions in the context of competency development.

Self-Efficacy Perspective on Achievement Behavior

For the past few years I have been engaged in a program of research exploring students' achievement-related cognitions in the context of competency development. This research has examined two general ideas. First, perceived self-efficacy is an important variable in understanding students' achievement behaviors. Second, educational procedures that help validate students' sense of efficacy promote task motivation and achievement.

Recent advances in instructional psychology have led to growing interest in how students structure and employ knowledge during the learning process (Resnick, 1981). This area seems fruitful to explore, because instructional procedures alone cannot fully account for students' diverse achievement patterns. I believe that perceived self-efficacy is an important variable in understanding what knowledge students acquire and how they utilize it in achievement contexts. Despite some differences, a number of other theoretical perspectives also stress the influence of personal cognitions on achievement behavior (Covington & Beery, 1976; DeCharms, 1968; Harter, 1978; Kukla, 1972; Moulton, 1974; Rotter, 1966; Weiner, 1979).

My plan for this article is first to discuss the hypothesized relationship of self-efficacy to achievement behavior. I then will present some research that tests hypotheses derived from the self-efficacy model, and will conclude by suggesting future research directions.

Self-Efficacy and Achievement

Self-efficacy refers to personal judgments of how well one can organize and implement behaviors in situations that may contain novel, unpredictable,

and possibly stressful elements (Bandura, 1977a, 1981, 1982). Perceived self-efficacy is hypothesized to have diverse effects in achievement contexts. First, self-efficacy can influence choice of activities (Bandura, 1977a). Students who hold a low sense of efficacy for accomplishing a task may avoid it altogether, whereas those who feel more efficacious are apt to engage in it more often. Second, self-efficacy can affect effort expenditure and task persistence. When facing obstacles, individuals who hold a high sense of efficacy display vigorous efforts and persist longer, whereas those who hold self-doubts slacken their efforts or quit altogether (Bandura & Schunk, 1981; Brown & Inouye, 1978; Schunk, 1981). Active engagement helps to strengthen self-efficacy and promote skills; students who avoid activities preclude skill development and remain inefficacious.

Third, self-efficacy can have emotional effects (Bandura, 1982). Clinical research shows that when individuals feel inefficacious about successfully interacting in a given situation they are apt to ruminate about it excessively and experience a high degress of stress (Beck, 1976). Adverse emotional reactions can interfere with learning and lead to lower academic performance, which helps reinforce a sense of inefficacy. Conversely, efficacious students should feel more confident in achievement situations and handle anxieties better.

In the self-efficacy model, other prominent psychological influences on achievement behavior besides self-efficacy include outcome expectations and performance standards. Outcome expectations refer to beliefs about the outcomes of one's actions. Students are not apt to spend much time on activities if the anticipated outcomes offer little or no incentive. Conversely, even inefficacious students nonetheless may engage in an activity if the expected rewards for successful performance are highly valued.

Unrealistic performance standards also can affect achievement efforts. Students who set low standards for themselves may not attempt to perform at a higher level even if they feel efficacious about doing so. In the process, they gain little new capability self-knowledge. In contrast, students who hold unrealistically high standards generally doom themselves to failure, which has a negative impact on self-efficacy. Given adequate outcome expectations and performance standards, self-efficacy is hypothesized to exert an important influence on the activities students engage in, the amount of effort they expend, the time they persevere, their attendant emotional reactions, and their level of achievement.

Sources of Efficacy Information

Capability self-knowledge is acquired through direct environmental interactions and socially mediated experiences (Bandura, 1981). There are four sources of efficacy information: actual performance attainments, socially comparative vicarious experiences, social persuasion, and indices of physiological arousal (Bandura, 1981).

Performance attainments. What students do provides the most valid information about self-efficacy. Students who experience repeated task successes are likely to experience a heightened sense of efficacy, whereas those who encounter difficulties are apt to remain inefficacious. Once a strong sense of efficacy is inculcated, an occasional failure should not lower self-efficacy much. Failure even could lead to a higher level of efficacy if subsequent sustained effort resulted in success, which would demonstrate that obstacles could be overcome (Bandura, 1977a).

Vicarious experiences. Capability self-knowledge can be acquired through observation of others' actions. In school, students gain much efficacy information vicariously. For example, teachers routinely model the application of skills. Modeling not only teaches skills but also conveys to students that

they too can succeed by performing in similar fashion.

Students also gain efficacy information vicariously through social comparison with peers. Seeing similar others succeed at a task conveys a sense of efficacy to observers; the thinking is that if others are capable, observers should be as well (Bandura, 1981). Social comparative information becomes increasingly important with development, because its effective utilization depends upon higher levels of cognitive development and experience in making comparative evaluations (Veroff, 1969). It is not until ages 5-6 that children begin to seek comparative information. In the early elementary-school years, children show an increasing interest in comparative information, and by the fourth-grade they utilize such information to help form self-evaluations of competence (Ruble, Boggiano, Feldman, & Loebl, 1980; Ruble, Feldman, & Boggiano, 1976).

Vicarious information will have a weaker effect on self-efficacy than actual performances because the effects of observations can be altered by subsequent self-efforts. Students who observe similar others acquire skills rapidly at a task have no guarantee that they will too, and any vicarious boosts in efficacy will be negated by subsequent personal failures.

Social persuasion. Students can acquire efficacy information through persuasion. Teachers occasionally attempt to persuade students to work more diligently by stating that they have the capability to do well; however, raises in self-efficacy via persuasion must be validated by subsequent performance. If students' increased efforts do not lead to success, any gains in self-efficacy will be ephemeral.

Attributional theories of achievement behavior postulate that students make causal ascriptions for their outcomes primarily in terms of ability,

effort, task difficulty, and luck (Frieze, 1980; Weiner et al., 1971). Some recent research has attempted to alter students' causal ascriptions and achievement behaviors by providing effort attributional feedback (Andrews & Debus, 1978; Chapin & Dyck, 1976; Dweck, 1975). Because effort is presumably under volitional control, ascribing past failures to insufficient effort should have motivational effects and lead to a higher level of performance.

In the self-efficacy model, causal attributions influence future behavior through their intervening effects on perceived self-efficacy. For example, attributions of success to high ability should heighten self-efficacy, whereas attributions of failure to insufficient effort may not necessarily lower it much. Attributional feedback constitutes a socially persuasive source of efficacy information. Telling children that they failed because they did not work hard enough conveys that they are efficacious and can succeed through diligent effort. As with other forms of social persuasion, the effectiveness of attributional feedback depends upon subsequent task outcomes.

Physiological indices. Students gain some self-knowledge from physiological indices. Signs of stress, such as trembling or sweating, indicate that one may not be capable enough to succeed. Dwelling on personal inadequacies may produce further anxieties. When students notice that they are reacting in less-agitated fashion to a situation, they should experience a heightened sense of efficacy for coping with it and perform more productively.

Integration of Efficacy Information

Efficacy appraisal is not a simple and straightforward process. People integrate and weight information from diverse sources and how they do this is not well understood (Bandura, 1981). Although developmental evidence shows that children progressively become more accurate in their self-evaluations (Harter, 1982), students occasionally misappraise their capabilities,

which can have adverse effects. Students who overestimate may become demoralized through repeated task failures, whereas those who underestimate may give up readily or shun achievement contexts and thereby preclude opportunities for skill and efficacy development (Schunk, 1981).

Even in achievement situations where self-efficacy is developed through enactive attainments, research has demonstrated that efficacy is not a mere reflection of past accomplishments (Bandura & Schunk, 1981; Schunk, 1981, 1982, in press-b). Prior performances are hypothesized to be weighted against various cues that can influence efficacy appraisals. Important cues include perceived task difficulty, effort expenditure, situational factors, and outcome patterns.

Success at a task perceived as difficult should raise self-efficacy more than success at a task viewed as easier; failure at a task that students believe is difficult should have less of a negative impact on self-efficacy than failure at a task thought to be easier. Students receive task difficulty information from various sources. Teachers often convey it directly by stating that a task is easy or hard. Task characteristics constitute another source. Although there are exceptions, arithmetic problems with more digits generally are more difficult to solve than those with fewer digits. Students acquire much task difficulty information through social comparison. A task that many students succeed at is judged easier than one in which the failure rate is high.

The relationship of effort expenditure to self-efficacy is complex and depends upon task outcome and perceived task difficulty. Success at a task viewed as easy offers little new efficacy information unless great effort is required, which signals that skills are lacking. Because high effort is often necessary to succeed at difficult tasks, success with less effort than

expected should strengthen self-efficacy. Failure despite high effort on tasks thought to be easy should negatively affect self-efficacy but have less effect with difficult tasks, whereas failure attributed to insufficient effort on any type of task should not influence self-efficacy much.

In their early stages, many student efforts aimed at skill improvement receive external support. For example, teachers monitor students' performances, provide corrective feedback in response to errors, and offer remedial instruction. External supports help to instate skills but do little to promote self-efficacy if students attribute their successes largely to the supports. Until students come to believe that they can succeed on their own they are likely to retain self-doubts. Periods of self-directed mastery, in which students apply newly-acquired skills unaided, foster the perception of personal success (Schunk, 1981).

Although most initial skill-improvement efforts contain failures, the perception of improvement with practice instates a sense of efficacy, which helps to sustain task motivation and leads to further learning. Conversely, self-efficacy will not improve much if students believe that their skills have stabilized at low levels.

Research Evidence

This section describes a set of research studies that collectively address the relationship of self-efficacy to achievement behavior in the context of competency development. The experimental procedures of these studies share many elements. Because this research focuses on processes whereby skills and self-efficacy can be developed when they initially are low, students who previously have demonstrated deficiencies in the task serve as subjects. In the research described, subtraction or division tasks are employed. At the outset, students are pretested individually by an adult tester on self-efficacy, skill, and persistence.

For the self-efficacy assessment, students are shown briefly sample problems that are graded in difficulty and that range from simple to quite complex. Brief exposure times give some idea of problem difficulty but do not permit mental solutions. For each sample, students privately judge their certainty of correctly solving the type of problem depicted. The 10-unit (10-100) efficacy scale ranges from high uncertainty (10), through intermediate values (50 60), to complete certitude (100). Students are judging their capability to solve different types of problems and not whether they can solve any particular problem.

To assess skill, students are given problems one at a time, and are told to decide for each problem whether they want to solve it and how long they want to work on it. The skill-test problems correspond to those on the efficacy assessment in form and operations required but they are not identical. The tester records the time students spend on problems as a measure of persistence.

Following the pretest, students are assigned randomly to experimental conditions and participate in a competency-development program over multiple sessions. The sessions include brief periodic instruction in component operations by an adult proctor, along with extended periods of individual problem solving. Experimental treatments are administered during the training sessions, and a posttest is given on completion of training.

Effort attributional feedback. The initial study explored the effects of effort attributional feedback in the context of two instructional treatments: cognitive modeling and didactic instruction (Schunk, 1981). In the modeling treatment, elementary-school children observed an adult model verbalize aloud division operations while simultaneously applying them to problems. The didactic treatment consisted of children reviewing instructional pages that

exemplified the solution of division problems step-by-step. There is evidence that coupling explanatory principles with exemplary modeling is more effective in developing cognitive skills than is providing explanatory principles alone (Rosenthal & Zimmerman, 1978).

Within each of these conditions, half of the children periodically received effort attributional feedback as they solved problems; children were told that they had worked hard after their efforts led to success and that they needed to work harder when difficulties followed less-diligent effort. The other half received no attributional feedback. Effort attributional feedback constitutes a socially persuasive means of conveying efficacy information. Linking effort with task outcomes should convey to children that they possess the requisite efficaciousness to succeed and can actualize their capabilities through hard work. From a developmental perspective, such feedback should be especially potent with young children, who tend to view outcomes as highly dependent upon effort and often equate effort with ability (Harari & Covington, 1981; Kun, 1977; Nicholls, 1979).

The results showed that both cognitive modeling and didactic instruction led to significant increases in self-efficacy, skill, and persistence, and that cognitive modeling resulted in significantly higher skill. In contrast, the effort feedback had no significant effect on any measure.

To explore the hypothesized relationship between self-efficacy and subsequent skillful performance, the probability of an accurate solution as a function of the strength of self-efficacy was computed by comparing each posttest efficacy judgment to the comparable skill-test problem. The number of problems that children solved correctly were summed within five different efficacy values and divided by the total number of judgments at those values to arrive at probabilities, which are portrayed in Figure 1. Consistent with

prediction, a close relationship was obtained between strength of self-efficacy and division performance.

Insert Figure 1 about here

The hypothesized effects of self-efficacy on achievement outcomes were explored more generally using path analysis to reproduce the correlation matrix consisting of instructional treatment (modeling-didactic), self-efficacy, persistence, and skill. Although path analysis cannot prove a theory to be correct, it is useful in rejecting causal models that demonstrate a poor fit to the original data (Kerlinger & Pedhazur, 1973). The model that best reproduced the data consisted of direct paths between treatment and skill, treatment and self-efficacy, self-efficacy and persistence, self-efficacy and skill, and persistence and skill. Although treatment exerted both a direct effect on skill as well as an indirect effect through persistence and self-efficacy, the effect of treatment on persistence operated indirectly through self-efficacy. The predicted effects of self-efficacy on skill and persistence were obtained.

As expected, the modeling treatment best promoted division skills. Surprisingly, modeling was not more effective in raising self-efficacy. It is possible that didactic children were overly swayed by their modest training successes while remaining uninformed of the extent of their deficiencies. Although the didactic treatment explained how to solve problems, children may not have comprehended the explanation fully in the absence of modeling.

The failure of the attributional feedback may have been due to the difficulty of the task. Information that effort expenditure can affect outcomes

should be maximally effective for intermediate-difficulty tasks (Kukla, 1972). Effort information should have less effect on performance when subjects perceive a task as difficult, since even high effort may not insure success. Division generally is regarded by educational practitioners as a difficult subject for children to master. The present sample of low achievers may well have viewed the task as difficult.

It also is possible that providing effort attributional feedback for success and difficulty conveyed markedly different efficacy information. As children work at a task and observe their progress, they begin to develop a sense of efficacy. Telling children that effort is the reason for their success should support their perceptions of skill improvement and convey that they can continue to perform well with hard work; however, telling them that they need to work hard might convey that they are not doing well. They might conclude that they are not very efficacious at the task despite some progress and might wonder whether more effort will produce better results. In short, the two forms of effort feedback may have worked at cross-purposes.

A second experiment disentangled these two forms of feedback (Schunk, 1982). An adult proctor briefly monitored children's performances periodically as they individually solved subtraction problems during a training program. One group (past attribution) had their prior achievement linked with effort during the monitoring by the proctor remarking, "You've been working hard." The proctor stressed the value of future effort to a second group (future attribution) by periodically remarking, "You need to work hard." A third group was monitored periodically but received no feedback, and a fourth group was not monitored.

The results showed that past attribution led to significantly higher levels of skill and self-efficacy compared with the other experimental

conditions, which did not differ. Past-attribution subjects also demonstrated a significantly higher rate of problem solving during training (training progress) than did future-attribution children and the nonmonitored controls. The results supported the idea that in contexts where children acquire efficacy information enactively self-efficacy is not a mere reflection of prior attainments. Although past-attribution children developed the highest level of self-efficacy from training, their training progress did not differ from that of subjects who were monitored but received no feedback.

Correlational analyses revealed significant and positive relationships between posttest self-efficacy and persistence, efficacy and skill, persistence and skill, training progress and efficacy, and training progress and skill. A regression analysis was conducted to determine what portion of the variation in posttest skill was accounted for by the joint influence of self-efficacy, training progress, and persistence. The results showed that the contributions of training progress (48%) and self-efficacy (20%) were statistically significant. The greater contribution of progress is partly artifactual because self-efficacy presumably influences progress. Together, the three predictors jointly accounted for 70% of the variation in subtraction skill.

Goal setting and social comparative information. Goal setting involves an internal comparison of desired standards against present performance level (Bandura, 1977b). When persons make self-satisfaction contingent on attaining a desired performance level, they are likely to sustain their efforts until they achieve their goals.

Of central importance to the goal-setting process are goal properties, such as specificity, difficulty level, and proximity (Bandura, 1977b; Latham & Yukl, 1975; Locke, 1968; Locke, Shaw, Saari, & Latham, 1981; Schunk & Gaa,

1981). Goals that incorporate specific standards of performance are more likely to activate self-evaluative reactions and lead to higher performance than are no explicit goals or vague goals, such as, "Do your best" (Locke, 1968; Locke et al., 1981). Goal difficulty refers to the level of task proficiency as assessed against a standard (Locke et al., 1981). Assuming that individuals have sufficient ability to accomplish the goal, there is much evidence demonstrating a positive and linear relationship between difficulty level and task performance (Locke et al., 1981).

Goals also can be distinguished by how far into the future they project. Proximal goals, which are close at hand and can be achieved rather quickly, result in greater self-motivation directed toward attainment and a higher level of performance than more distant goals (Bandura & Simon, 1977). Proximal goals should be especially influential with young children, who have short time frames of reference and who may not be capable of meaningfully representing distant goals in thought (Schunk & Gaa, 1981). Pursuing proximal goals also can promote self-efficacy. As children observe their progress toward a proximal goal they begin to develop a sense of efficacy. Even young children can gauge progress toward a short-term goal. Heightened efficacy should help sustain task involvement and foster competency development. Because progress toward a distal goal is more difficult to gauge, children may feel less sure about their level of competence.

A recent experiment assessed the effects of goal proximity on the acquisition of subtraction skills and self-efficacy (Bandura & Schunk, 1981). Children were told that they could work on an instructional packet consisting of seven sets of material over seven sessions. Some children pursued a proximal goal of completing one set of material each session; a second group pursued a distal goal of completing all seven sets by the end of the seventh

session; and a third group worked on the packet without goal instructions. Thus, the proximal and distal goals represented the same amount of work.

Results showed that proximal subjects demonstrated a significantly higher rate of problem solving during training (training progress), as well as significantly higher levels of posttest skill and self-efficacy, compared with distal- and no-goal children. Correlational analyses revealed significant and positive relationships between posttest self-efficacy and skill, training progress and efficacy, and training progress and skill. Persistence bore a significant relationship to skill only among the most difficult test problems.

The motivational and efficacy-enhancing effects of proximal goal setting bear a certain theoretical similarity to the previously-discussed ideas on social comparative information. Information indicating how other similar students perform at a task provides a standard against which students can gauge their progress, and thereby helps validate their sense of efficacy. In turn, a heightened sense of competence should help sustain task motivation and lead to greater competency development.

A recent experiment compared the effects of proximal goals to those of social comparative information on achievement behaviors (Schunk, in press-a). Children who were deficient in division skills participated in a division competency-development program over two sessions. One group was given comparative information each session indicating the average number of problems solved by other similar children. A second group pursued a proximal goal of completing a given number of problems each session. A third group received both treatments, and a fourth group received neither treatment. The goals and comparative information indicated the same level of attainment.

The results showed the combining the two treatments led to the highest level of skill; the other groups did not differ. Combined-treatment children

also perceived themselves as significantly more efficacious than children receiving only comparative information and the control subjects. Although the combined and goals-only conditions did not differ in level of self-efficacy, combined children demonstrated more rapid problem solving during training than did goals-only and control subjects.

These results, contrary to those of Bandura and Schunk (1981), showed that providing goals with no information on what they signified inflated self-efficacy judgments somewhat. The fact that a more difficult subject matter was used in the Schunk (in press-a) study may have been responsible. Given their deficiencies in division, goals-only children may have perceived solving several division problems as very difficult, and may have been swayed by their training successes. Combining goals with comparative information conveyed that the goals were attainable. The belief that goals are attainable should yield higher expectations of success, which promotes goal acceptance and task performance (Locke et al., 1981). At the same time, combined-treatment children should have had no reason to feel overly efficacious as a result of their training successes because they knew that the goals represented average attainment by similar others. Compared with those receiving the combined treatment, children given comparative information but no goals may have felt less efficacious and been less committed to performing at the comparative level.

Reward contingencies. A commonly-held belief is that the offer of an extrinsic reward promotes performance. Although much research supports this idea, some studies have found detrimental effects of rewards on performance (Glucksberg, 1962; McCullers & Martin, 1971). McGraw (1978) proposed that experimental tasks be classified on whether they initially appear attractive or aversive and whether they require an algorithmic or heuristic solution.

Offering a reward should have a detrimental effect on performance when a task is initially attractive and requires a heuristic solution; for the other combinations, rewards should facilitate or have no effect on performance depending upon whether the task is viewed as aversive or attractive, respectively.

Students who have encountered repeated difficulty at arithmetic tasks generally do not view them in an attractive light, and since subtraction and division involve algorithmic solutions we might expect rewards to facilitate problem solving. Within this context, however, different reward contingencies may convey markedly different efficacy information. Rewards may be offered commensurate with progress or merely for engaging in the task. Telling children that they can earn rewards based on their enactive accomplishments conveys a sense of efficaciousness for successfully solving problems. This sense of efficacy subsequently is validated as children observe their actual progress. Heightened efficacy should sustain task motivation and help promote skills. Children's sense of competence is validated further upon receipt of the reward since it symbolizes children's attainments.

In contrast, when rewards are offered merely for task participation children should not experience a comparable increase in efficacy. Such progress-noncontingent rewards even might convey negative efficacy information: Children might infer that they are not expected to accomplish much and that they do not possess the requisite efficaciousness to perform well. Subsequent task motivation and skill development should be lower than that obtained under a reward system tied to enactive attainments.

These hypotheses were tested in the context of a division competency-development program (Schunk, Note 1). One group of children (performance-contingent reward) were told that they would earn five points for each

problem solved during training and that following training they would exchange their points for prizes equal in the monetary value to their points. A second group (task-contingent reward) were told that they would receive prizes for participating in the program. At the end of training, each of these subjects drew the number $2.00 from a hat, because pilot work showed that children could complete 40 problems. To disentangle the effects of reward anticipation from reward receipt, a third group (unexpected reward) were unexpectedly allowed to draw a number ($2.00) and choose prizes at the end of training. Groups did not differ on amount of money received (performance-contingent $\underline{M}$ = $2.10).

The results supported the hypotheses. Compared with children in the other conditions, performance-contingent subjects solved problems more rapidly during training and demonstrated the highest levels of posttest division skill and self-efficacy. In contrast, offering rewards for participation resulted in no benefits over those obtained from merely providing training. Correlational analyses revealed significant and positive relationships between posttest self-efficacy and persistence, efficacy and skill, persistence and skill, and training progress and skill.

Progress monitoring. There is growing interest in self-regulation as a means of initiating and maintaining behavioral change (Bandura, 1977b; Kanfer, 1980). Self-regulation includes three components: self-monitoring, self-evaluation, and self-reinforcement (Kanfer, 1980). Self-monitoring refers to deliberate attention to some aspect of one's behavior, and is often accompanied by recording its frequency. During self-evaluation, persons compare their level of attainment against some desired performance standard, after which some form of self-reinforcement may be administered.

Although self-monitoring generally is used in a larger therapeutic context to determine baseline rates of behaviors targeted for alteration, there is evidence that self-monitoring alone promotes behavioral change (Broden, Hall, & Mitts, 1971; Sagotsky, Patterson, & Lepper, 1978). Where explicit performance standards and reinforcement contingencies do not exist, the effectiveness of self-monitoring may depend upon the extent to which covert self-evaluation occurs (Sagotsky et al., 1978).

Given these considerations, it would seem that self-monitoring of progress during competency development could help validate children's sense of efficacy and thereby boost achievement, because explicit monitoring that includes recording of performance attainments provides a reliable guide to progress. To test this hypothesis, a group of children who were deficient in subtraction skills participated in a subtraction competency-development program over several sessions (Schunk, in press-b). Some children (self-monitoring) reviewed their work at the end of each session and recorded the number of pages completed. To investigate the effects of monitoring procedures more generally, a second condition (external monitoring) was included in which an adult proctor recorded the number of pages that children had completed. A third condition (no monitoring) received the competency-development program without monitoring.

The results showed that the monitoring itself was more important than the monitoring agent. Children whose training progress was monitored, either by themselves or by the proctor, demonstrated significantly higher skill, self-efficacy, and persistence, compared with no-monitoring subjects, but the two monitoring conditions did not differ from one another. This study also supported the idea that percepts of self-efficacy are not synonymous with training accomplishments since the three experimental conditions did not differ in their rates of problem solving during training.

Summary and Future Directions

I believe that these research findings offer encouraging evidence in support of the idea that perceived self-efficacy is an important variable in achievement contexts. I also believe that the differential effectiveness of the various treatments in promoting task motivation and achievement stems in part from the extent to which they validate students' level of efficacy.

At this point, it seems important to conduct a more fine-grained analysis of how students process, weight, and integrate information derived from enactive attainments to arrive at judgments of personal efficacy. Little is known about how achievement-related cognitions are formed in the context of competency development. In one potentially useful approach, children verbalized as they solved problems (Diener & Dweck, 1978). These verbalizations were recorded and categorized, such as representing useful task strategies, attributions, self-instructions, and affective responses. This type of research not only could identify how students form achievement-related beliefs but also could explore how different beliefs affect subsequent achievement behavior.

Other research areas that seem fruitful to explore are discussed in the following paragraphs.

Vicarious induction of self-efficacy. The students in the preceding studies had enactive experiences to draw on in forming judgments of self-efficacy. Although this research showed that self-efficacy was not a mere reflection of past performances, self-efficacy was influenced heavily by them.

A clearer picture of the role of self-efficacy in achievement contexts could be obtained by instating self-efficacy solely through vicarious means. Clinical research has demonstrated a close correspondence between vicariously-induced efficacy and subsequent performance at the level of

individual tasks (Bandura, Reese, & Adams, 1982). To test this relationship in an educational context, students who lack some cognitive skill merely could observe modeled demonstrations of problem-solving strategies and their application. Subjects could be given efficacy probes periodically until their efficacy judgments matched a preassigned level, at which time performance could be assessed. In the absence of past performance guides and knowledge of outcomes, students would have to judge efficacy based solely on what they observed and how they cognitively processed their observations. A close relationship between self-efficacy and subsequent performance under these circumstances would support the idea that self-efficacy plays an important role in achievement contexts.

Affective consequences of self-efficacy. Although this article focuses on the relationship of self-efficacy to achievement behavior, self-efficacy also should have affective manifestations. Weiner and his colleagues report that differential attributions for successes and failures give rise to different affects, which have important effects on achievement behaviors (Weiner, 1980; Weiner, Russell, & Lerman, 1978). Thus, failure attributed largely to lack of ability may give rise to feelings of incompetence, whereas an attribution to insufficient effort may lead to guilt feelings or shame.

Bandura (1982) discusses the idea of efficacy-based futility. For example, students may believe that successful efforts will be rewarded by the teacher but may have serious doubts about their capability to succeed. Such students may feel demoralized and devalue themselves, and may give up readily when they encounter difficulties at achievement tasks.

At the same time, perceived inefficacy may not necessarily be accompanied by negative affective reactions. Different affects might arise depending upon factors such as contextual influences and the perceived importance of the

task. Research is needed on the affective reactions that arise from different levels of self-efficacy in achievement settings and how these reactions are influenced by situational variables.

Self-efficacy and instructional practices. Self-efficacy seems relevant to the instructional process itself. Although different instructional practices may be equally well designed to teach skills, they may differ in their effects on self-efficacy. Curriculum designers should determine whether instructional materials and practices properly enhance students' sense of efficacy.

Once skills are minimally cultivated, periods of self-directed mastery, in which students practice and refine skills with little or no assistance, are effective in strengthening self-efficacy (Schunk, 1981). With the advent of microcomputers in schools, students have an excellent tool that they can use largely on their own to refine skills. Research needs to address how microcomputers can be utilized most effectively to enhance students' sense of efficacy in different skill areas.

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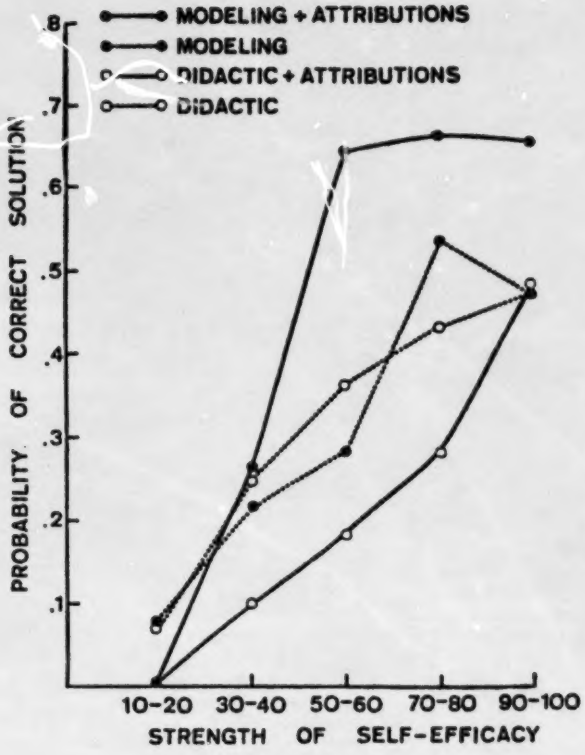
Figure Caption

Figure 1. Probability of a correct solution as a function of strength of self-efficacy.


MODELING + ATTRIBUTIONS
MODELING
DIDACTIC + ATTRIBUTIONS
DIDACTIC
PROBABILITY OF CORRECT SOLUTION
.8
.7
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.1
10-20
30-40
50-60
70-80
90-100
STRENGTH OF SELF-EFFICACY